

WHAT IS CLAIMED IS:

1. A multiple-layer diffusion junction capacitor structure comprising:  
an N-type region formed in a semiconductor substrate and having an N-type vertical portion and a plurality of spaced-apart N-type fingers that extend from the N-type vertical portion; and  
5 a P-type region formed in a semiconductor substrate and having a P-type vertical portion and a plurality of spaced-apart P-type fingers that extend from the P-type vertical portion, and  
wherein the N-type fingers and the P-type fingers are inter-digitated.  
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2. A multiple-layer diffusion junction capacitor structure as in claim 1, and further comprising:  
a first conductive contact formed on an upper surface of the N-type region;  
and  
15 a second conductive electrode formed on an upper surface of the P-type region.  
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3. A multiple-layer diffusion junction capacitor structure as in claim 2, and wherein both the first conductive electrode and the second conductive electrode comprise aluminum.
4. A method of forming an N-layer junction capacitor structure in a semiconductor substrate, wherein N is an integer, the method comprising:  
forming a patterned mask on an upper surface of the semiconductor substrate,  
25 the patterned mask having at least one opening formed therein to expose an upper surface area of the semiconductor substrate;  
forming a sequence of N alternating implants of P-type dopant and of N-type dopant at negative and positive implant angles, respectively, for a particular conductivity type dopant each implant being performed with a different energy and implant dose, thereby  
30 resulting in N inter-digitated layers of P-type dopant and N-type dopant formed in a semiconductor substrate; and

forming a first conductive electrode in electrical contact with the P-type dopant layers and a second conductive electrode in electrical contact with the N-type dopant layers.

5        5.      A method as in claim 4, and wherein the patterned mask comprises silicon oxide.

6.      A method as in claim 4, and wherein the first and second conductive electrodes comprise alumimun.